TRIODE-OUTPUT PENTODE

The triode section is intended for use as frame oscillator and A.F. amplifier. The pentode section is intended for use as frame output tube and A.F. power amplifier.

QUICK REFERENCE DATA			
Triode section			
Anode current	I_a	3.5	mA
Transconductance	S	2.2	mA/V
Amplification factor	μ	70	-
Pentode section			
Anode peak voltage	V_{a_p}	max. 2.5	kV
Anode current	I_a	41	mA
Transconductance	S	7.5	mA/V
Amplification factor	$\mu_{g_2g_1}$	9.5	-
Output power	W_o	3.5	W

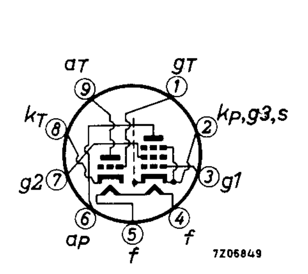
HEATING: Indirect by A.C. or D.C.; parallel supply

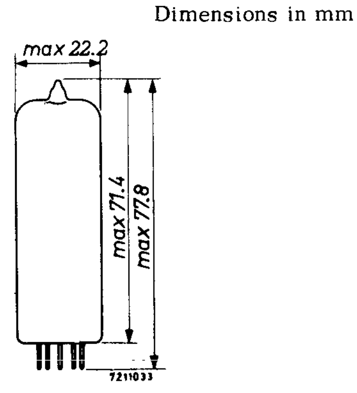
Heater voltage	V_f	6.3	V
Heater current	I_f	780	mA

DIMENSIONS AND CONNECTIONS

Dimensions in mm

Base: Noval





CAPACITANCES

Triode section

Anode to all except grid	$C_{a(g)}$		4.3	pF
Grid to all except anode	$C_{g(a)}$		2.7	pF
Anode to grid	C_{ag}		4.4	pF
Grid to heater	C_{gf}	max.	0.1	pF

Pentode section

Anode to all except grid No.1	$C_{a(g_1)}$		8.0	pF
Grid No.1 to all except anode	$C_{g_1(a)}$		9.3	pF
Anode to grid No.1	C_{ag_1}	max.	0.3	pF
Grid No.1 to heater	C_{g_1f}	max.	0.3	pF

Between triode and pentode sections

Anode triode to grid No.1 pentode	C_{aTg_1P}	max.	0.02	pF
Grid triode to anode pentode	C_{gTaP}	max.	0.02	pF
Grid triode to grid No.1 pentode	C_{gTg_1P}	max.	0.025	pF
Anode triode to anode pentode	C_{aTaP}	max.	0.25	pF

TYPICAL CHARACTERISTICS

Triode section

Anode voltage	V_a	100	V
Grid voltage	V_g	0	V
Anode current	I_a	3.5	mA
Transconductance	S	2.2	mA/V
Amplification factor	μ	70	-

Pentode section

Anode voltage	V_a	170	V
Grid No.2 voltage	V_{g_2}	170	V
Grid No.1 voltage	V_{g_1}	-11.5	V
Anode current	I_a	41	mA
Grid No.2 current	I_{g_2}	9	mA
Transconductance	S	7.5	mA/V
Amplification factor	$\mu_{g_2g_1}$	9.5	-
Internal resistance	R_i	16	kΩ

OPERATING CHARACTERISTICS

Triode section as A.F. amplifier

A.				
Signal source resistance	R_s	0.22		MΩ
Grid resistor	R_g	3		MΩ
Grid resistor of next stage	R_g	0.68		MΩ
Supply voltage	V_b	200	170	V
Cathode resistor	R_k	2.2	2.7	kΩ
Anode resistor	R_a	220	220	kΩ
Anode current	I_a	0.52	0.43	mA
Voltage gain	V_o/V_i [1]	52	51	-
Max. output voltage	$V_{o\,max}$	26	25	V_{RMS}
Distortion	d_{tot} [2]	1.6	2.3	%

B.						
Signal source resistance	R_s	0.22				MΩ
Grid resistor	R_g	22				MΩ
Grid resistor of next stage	R_g'	0.68				MΩ
Supply voltage	V_b	200	200	170	170	V
Cathode resistor	R_k	0	0	0	0	Ω
Anode resistor	R_a	100	220	100	220	kΩ
Anode current	I_a	1.05	0.61	0.86	0.50	MΩ
Voltage gain	V_o/V_i [1]	50	55	49	53	-
Max. output voltage	$V_{o\,max}$	24	25	19	20	V_{RMS}
Distortion	d_{tot} [3]	1.5	1.4	1.4	1.4	%

MICROPHONY AND HUM

The triode section can be used without special precautions against microphony and hum in circuits in which an input voltage of minimum 10 mV_{RMS} is required for an output of 50 mW of the output stage. Z_g(50 Hz) = 0.25 MΩ.

[1]) Measured at small input voltage.
[2]) At lower output voltages the distortion is proportionnally lower.
[3]) At lower output voltages down to 5 V_{RMS} the distortion is approximately constant. At values below 5 V_{RMS} the distortion is approximately proportional to V_o.

OPERATING CHARACTERISTICS

Pentode section

A.F. power amplifier, class A (measured with V_k constant)

Supply voltage	$V_{ba} = V_{bg_2}$		200			272		V
Grid No.2 series resistor (non-decoupled)	R_{g_2}		470			2200		Ω
Cathode resistor	R_k		330			650		Ω
Load resistance	$R_{a\sim}$		4.5			8		kΩ
Grid No.1 driving voltage	V_i	0	0.66	6.7	0	0.9	9.5	V_{RMS}
Anode current	I_a	35		37	28		27	mA
Grid No.2 current	I_{g_2}	7.8		13.3	6.5		10.8	mA
Output power	W_o	0	0.05	3.3	0	0.05	3.5	W
Distortion	d_{tot}	-	-	10	-	-	10	%

A.F. power amplifier, class AB, two tubes in push-pull

Anode supply voltage	V_{ba}	200		250		V
Grid No.2 supply voltage	V_{bg_2}	200		200		V
Common cathode resistor	R_k	170		220		Ω
Load resistance	$R_{aa'\sim}$	4.5		10		kΩ
Grid No.1 driving voltage	V_i	0	14.2	0	12.5	V_{RMS}
Anode current	I_a	2x35	2x42.5	2x28	2x31	mA
Grid No.2 current	I_{g_2}	2x8	2x16.5	2x5.8	2x13	mA
Output power	W_o	0	9.3	0	10.5	W
Distortion	d_{tot}	-	6.3	-	4.8	%

Frame output application

The circuit should operate satisfactorily with a peak anode current I_{ap} = 85 mA at V_a = 50 V, V_{g_2} = 170 V, V_f = 6.3 V. The minimum available I_{ap} at end of life is;

70 mA at V_a = 50 V, V_{g_2} = 170 V, V_f = 5.5 V
80 mA at V_a = 50 V, V_{g_2} = 190 V. V_f = 5.5 V.

LIMITING VALUES (Design centre rating system)

Triode section

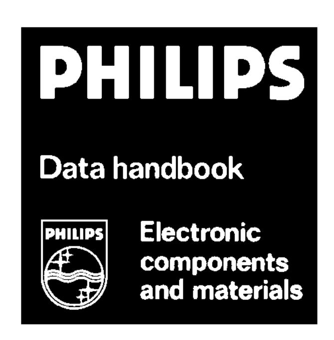
Anode voltage	V_{a_o}	max.	550	V
	V_a	max.	300	V
Anode peak voltage	V_{a_p}	max.	600	V [1]
Anode dissipation	W_a	max.	1	W
Cathode current, average	I_k	max.	15	mA
peak	I_{k_p}	max.	100	mA [1]
Grid resistor for fixed bias	R_g	max.	1	MΩ
for automatic bias	R_g	max.	3	MΩ
Grid impedance at 50 Hz	Z_g	max.	0.5	MΩ
Cathode to heater voltage	V_{kf}	max.	100	V

Pentode section

Anode voltage	V_{a_o}	max.	550	V
	V_a	max.	300	V
Anode peak voltage, positive	V_{a_p}	max.	2.5	kV [1]
negative	$-V_{a_p}$	max.	500	V
Anode dissipation for frame ouput application	W_a	max.	5	W
for A.F. output application	W_a	max.	7	W
Grid No.2 voltage	$V_{g_{2o}}$	max.	550	V
	V_{g_2}	max.	300	V
Grid No.2 dissipation, average	W_{g_2}	max.	2	W
peak	$W_{g_{2p}}$	max.	3.2	W
Cathode current	I_k	max.	50	mA
Grid No.1 resistor for fixed bias	R_{g_1}	max.	1	MΩ
for automatic bias	R_{g_1}	max.	2	MΩ
Cathode to heater voltage	V_{kf}	max.	150	V

For curves of the ECL82 please refer to PCL82

[1]) Max. pulse duration 4% of a cycle with a maximum of 0.8 msec.



ECL82

page	sheet	date
1	1	1969.12
2	2	1969.12
3	3	1969.01
4	4	1969.12
5	5	1969.01
6	FP	1999.08.15